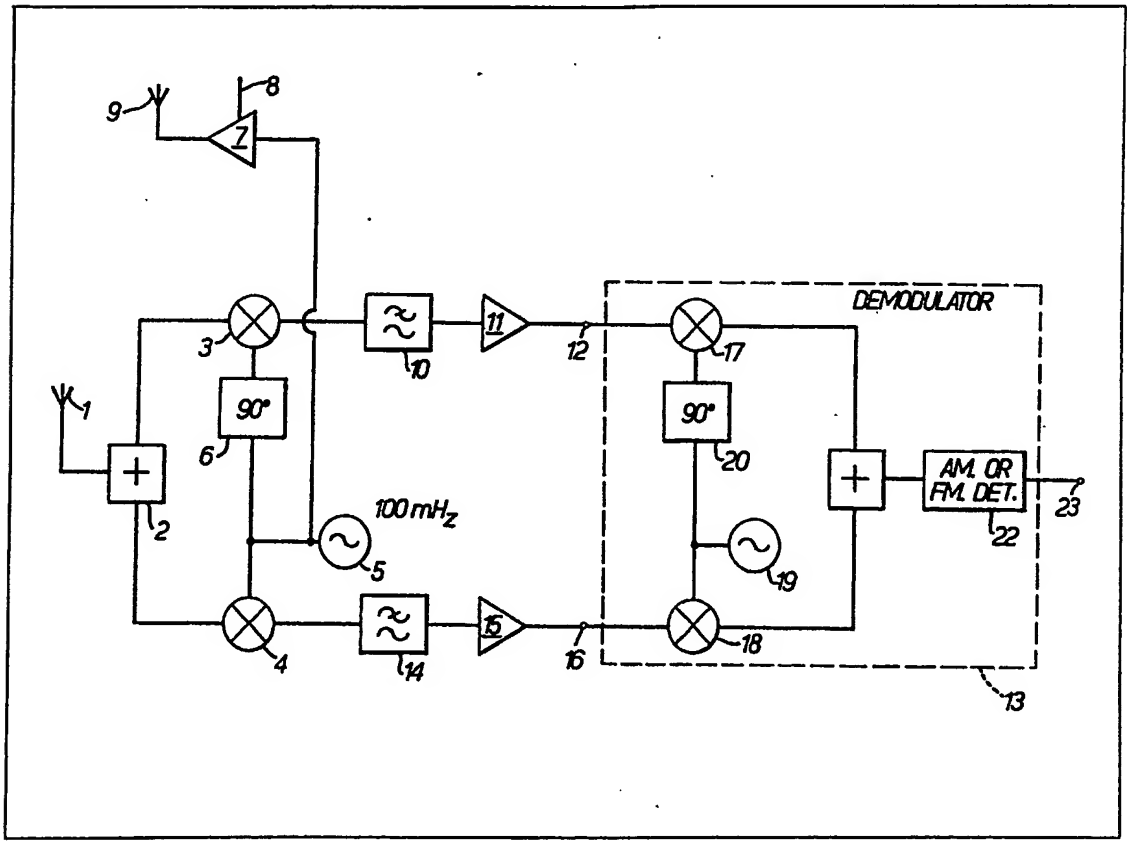
(12) UK Patent Application (19) GB (11) 2 052 196 A

(21) Application No 7922417
(22) Date of filing 27 Jun 1979
(43) Application published
21 Jan 1981
(51) INT CL³
H03D 1/22
(52) Domestic classification
H3Q DDH
H3A 1A3 4C1
(56) Documents cited
GB 1534484
GB 1178639
GB 1172977
GB 1172975
GB 1079864
GB 863165
GB 669113
(58) Field of search
H3A
H3Q
H3T
H4P
(71) Applicants
The Plessey Company Limited, Vicarage Lane, Ilford, Essex
(72) Inventor
Christopher Keith Richardson
(74) Agent
N. E. Fish

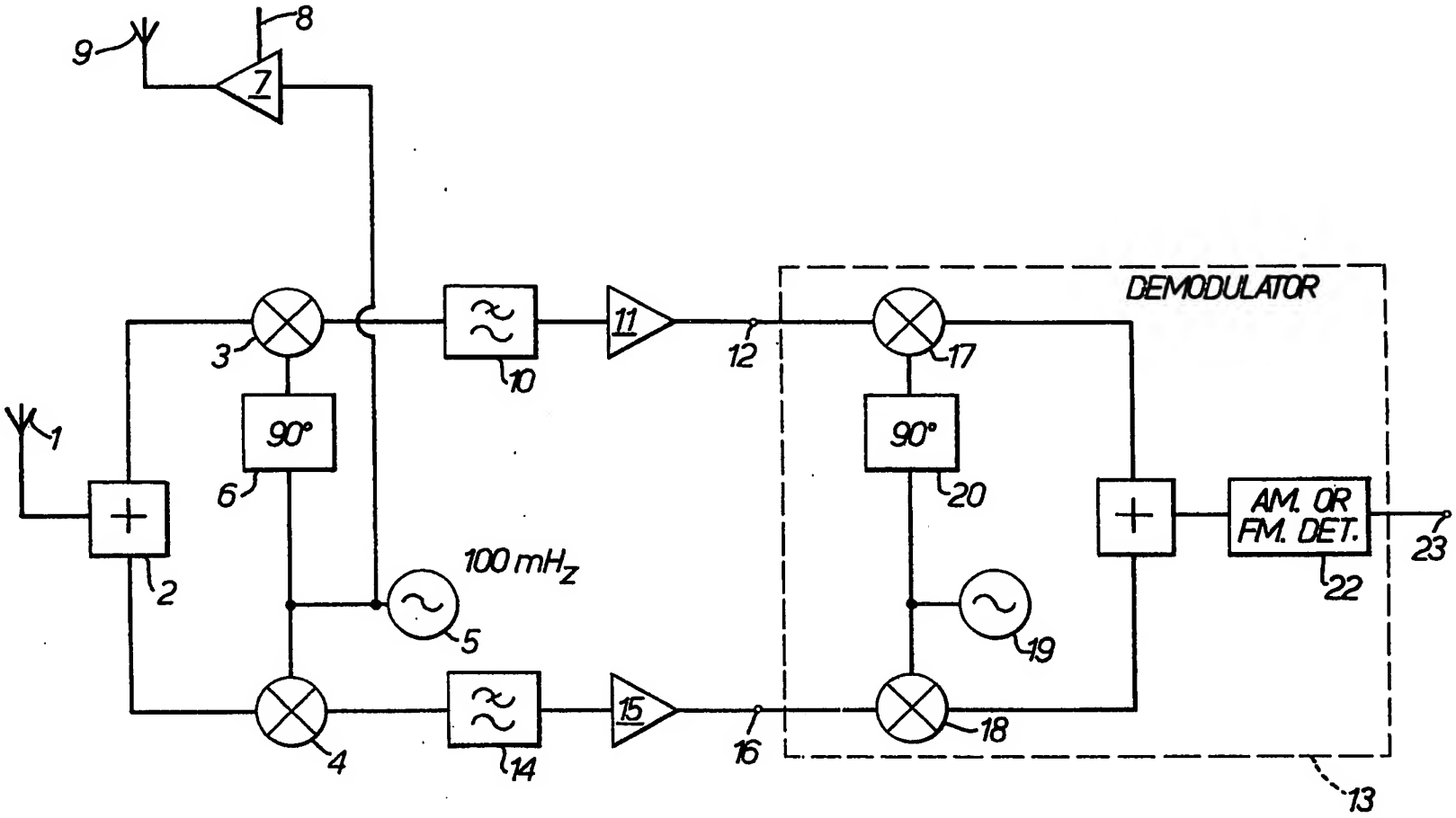
(54) Demodulators

(57) A demodulator of the kind which receives a pair of phase quadrature related signals carrying in combination data to be demodulated comprising a pair of multiplicative mixers 17, 18 to which the phase quadrature related signals are fed, one to each mixer, a phase quadrature device 20, a local oscillator 19 arranged to feed the mixers with local oscillator signals via the phase quadrature device so that the local oscillator signals received by respective mixers are in phase quadrature, a combiner to which output signals from the mixers are fed and a detector 22 fed from the combiner for providing an output signal corresponding to the modulation carried by the phase quadrature related signals.
The demodulator may form part of a common channel duplex transceiver for AM or FM reception having a diode detector or Foster-Seeley discriminator. A modulator 7 is also fed with an output from an oscillator 5 which feeds in quadrature a pair of multiplicative mixers 3, 4 at the input of the transceiver.

The drawing originally filed was informal and the print here reproduced is taken from a later filed formal copy.



GB 2 052 196 A



1/1

2052196

SPECIFICATION

Improvements in or relating to demodulators

This invention relates to demodulators more especially it relates to demodulators of the kind which receive a pair of phase quadrature related signals carrying in combination data to be demodulated.

The invention is especially although not exclusively applicable to an FM common channel duplex transceiver as described in our G.B. Patent Application No. 10360/76 (Serial No 1577514) or to an a.m. common channel duplex transceiver as described in our co-pending patent application No.

According to the present invention a demodulator of the kind which receives a pair of phase quadrature related signal carrying in combination data to be demodulated, comprises a pair of multiplicative mixers to which the phase quadrature related signals are fed one to each mixer, a phase quadrature device, a local oscillator arranged to feed the mixers with local oscillator signals via the phase quadrature device so that the local oscillator signals received by respective mixers are in phase quadrature, combiner means to which output signals from the mixers are fed and detector means fed from the combiner means and providing an output signal corresponding to the modulation carried by the phase quadrature related signals.

The kind of detector means used will be chosen in accordance with the character of the modulation carried by the phase quadrature related signals.

According to one embodiment of the invention, for the detection of an a.m. modulated signal carried by the phase quadrature related signals the detector means comprises an envelope detector which may simply comprise a diode detector.

According to another embodiment of the invention, for the detection of f.m. modulation carried by the phase quadrature related signals the detector means comprises an f.m descriminator or ratio detector adapted to demodulate frequency modulation which deviates about a centre frequency corresponding to the frequency of the said oscillator.

According to the said one embodiment of the invention the demodulator means may form a part of a common channel duplex transceiver suitable for a.m. reception and as described in our co-pending patent application No.

According to the other embodiment of the invention the demodulator means may form a part of a common channel duplex transceiver suitable for FM reception as claimed in and/or as described in our U.K. Patent Application No. 10360/76. (Serial No 1577514)

Some embodiments of the invention will now be described by way of example with reference to the accompanying drawing which is a generally schematic block diagram of a common channel duplex transceiver embodying a demodulator.

Referring now to the drawing the transceiver comprises a receiving aerial 1 signals from which are fed via a duplexer 2 to a pair of multiplicative mixers 3 and 4. The mixers are fed with a local oscillator signal from an oscillator 5, the mixer 3 being fed with signals from the local oscillator via a phase quadrature device 6 whereby local oscillator signals fed to the mixers 3 and 4 are in phase quadrature. Output signals for transmission are fed from the oscillator 5 to a modulator 7 which receives modulation signals on line 8 and provides output signals for transmission which are fed to an aerial 9. Output signals from the mixer 3 are fed via a low pass filter 10 and an amplifier 11 to one port 12 of a demodulator shown within the broken line 13. Output signals from the mixer 4 are fed via a low pass filter 14 and an amplifier 15 to the other port 16 of the demodulator shown within the broken line 13. The demodulator comprises a pair of multiplicative mixers 17 and 18 which receive phase quadrature related signals from the input ports 12 and 16 respectively and to which are fed phase quadrature related local oscillator signals from a local oscillator 19 and a phase quadrature device 20. Output signals from the mixers 17 and 18 are fed to an additive combiner 21 and output signals from the combiner are fed to a detector 22 which provides on an output line 23 a signal corresponding to the modulation carried by signals received at the aerial 1.

The nature of the detector 22 will be chosen in dependence upon the kind of modulation received at the aerial 1. Thus for f.m. reception a descriminator such as a Foster-Seeley descriminator may be used or alternatively for f.m. a ratio detector may be used. For the reception of a.m. modulation the detector 22 may comprise any form of envelope detector such as a simple diode detector. Such a.m. and f.m. detectors are well known to those skilled in the art and will not be described herein in detail.

It will be appreciated that the present invention is concerned more especially with the provision of a demodulator and therefore operation of the main part of the common channel duplex transceiver has not been shown in detail and will not be described herein. Attention is however directed to our co-pending U.K. Patent Application Nos. 10360/76 (Serial No 1577514) and in which a.m and f.m. common channel duplex transceivers respectively are fully described. A demodulator of the kind which forms the subject of the present invention operates to synthesise from the phase quadrature related signals fed to the ports 12 and 16 a carrier frequency which is a replica of the signal received at the aerial 1 in all respects but which deviates for f.m signals about the frequency of the local oscillator 19. In one embodiment the frequency of the oscillator 5 might be 100 Mhz whereas the frequency of the local oscillator 19 might conveniently be .5 Mhz. For the reception of frequency modulated signals, as the input frequency changes at 12 and 16, the side bands present in the combiner 21 move apart with respect to a centre frequency corresponding to the

frequency of the local oscillator 19. In contradistinction, if the local oscillator 19 frequency changes, it can be shown that the side bands move together with respect to a centre frequency corresponding to the frequency of the local oscillator 19.

CLAIMS

1. A demodulator of the kind which receives a pair of phase quadrature related signals carrying in combination data to be demodulated comprising a pair of multiplicative mixers to which the phase quadrature related signals are fed, one to each mixer, a phase quadrature device, a local oscillator arranged to feed the mixers with local oscillator signals via the phase quadrature device so that the local oscillator signals received by respective mixers are in phase quadrature, combiner means to which output signals from the mixers are fed and detector means fed from the combiner means for providing an output signal corresponding to the modulation carried by the phase quadrature related signals.

2. A demodulator as claimed in claim 1 wherein the detector means comprises an envelope detector for the detection of a.m. modulated signals carried by the phase quadrature related signals.

3. A demodulator as claimed in claim 1 wherein the detector means comprises an f.m. discriminator or ratio detector adapted to demodulate frequency demodulation which deviates about a centre frequency corresponding to the frequency of the said oscillator.

4. A common channel duplex transceiver suitable for a.m. reception as claimed in our co-pending patent application No. 7922701 and including a demodulator as claimed in any preceding claim.

5. A common channel duplex transceiver suitable for f.m. reception as claimed in or as described in our U.K. patent application No. 10360/76 (Serial No 1577514) and including a demodulator as claimed in any of claims 1 to 4.

6. A demodulator as hereinbefore described with reference to the accompanying drawings.

7. A common channel duplex transceiver including a demodulator as claimed in claim 6.

Printed for Her Majesty's Stationery Office by the Courier Press, Leamington Spa, 1981. Published by the Patent Office, 25 Southampton Buildings, London, WC2A 1AY, from which copies may be obtained.